



New national and regional Annex I Habitat records: from #102 to #122*

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Abstract

New Italian data on the distribution of the Annex I Habitats are reported in this contribution. Specifically, 9 new occurrences in Natura 2000 sites are presented and 34 new cells are added in the EEA 10 km × 10 km reference grid. The new data refer to the Italian administrative regions of Abruzzo, Apulia, Calabria, Latium, Lombardy, Marche, Sardinia, Sicily, Tuscany and Umbria.

* Topical Collection: "Towards 2030: efforts in habitat recording and the reporting cycle of the Habitats Directive – A scientific collection for habitat conservation".

Keywords

vegetation, 1430, 3140, 3150, 3170*, 3240, 5210, 5330, 6110*, 6430, 6510, 7210*, 7230, 8130, 91E0*, 9320, 9330

Introduction

This is the 10th contribution reporting records of new occurrences of Annex I Habitats in Europe. By comparing the results of the 4th Report ex-Art. 17 of Annex I Habitat Monitoring in Europe (Eionet 2019), these cell occurrences are newly recorded for Italy. The related phytosociological relevés of each contribution are going to be archived in the Italian database “VegItaly” (Gigante et al. 2012; Landucci et al. 2012).

Habitats records

Following the standard format of Gigante et al. (2019a), all species data, site data and descriptions of the new habitat records are hereafter provided. We report a synthetic overview in Table 1, offering a summary of the novelties. We used the open source QGIS Geographic Information System (QGIS.org 2020) for mapping purposes. Relevés and figures are provided as Suppl. materials 1, 2.

Table 1. Synthetic overview of the newly reported data.

Hab ID	Hab name	Cell ID	Country	BR	N2000 Site	Authors
1430	Halo-nitrophilous scrubs (<i>Pegano-Salsotea</i>)	10kmE483N175	Italy	MED	IT9340091	Morabito A, Musarella CM, Spampinato G
		10kmE451N226			-	Mei G, Stinca A
3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	10kmE423N181	Italy	MED	-	Cannucci S, Fiaschi T, Bonari G
		10kmE442N225, 10kmE437N220.			-	Fiaschi T, Fanfarillo E, Angiolini C
3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation	10kmE425N184, 10kmE422N181, 10kmE422N180, 10kmE420N184, 10kmE424N185, 10kmE418N179, 10kmE422N183, 10kmE427N185, 10kmE426N194, 10kmE423N178	Italy	MED	-	Cannucci S, Mascia F, Angiolini C
		10kmE471N167			-	Gianguzzi L
3170*	Mediterranean Temporary Ponds	10kmE498N195, 10kmE499N196	Italy	MED	-	Tomaselli V, Tavilla G
		10kmE460N203			IT6040006	Di Pietro R, Minutillo F
3240	Alpine rivers and their ligneous vegetation with <i>Salix eleagnos</i>	10kmE458N219	Italy	CON	IT5330029	Tesei G, Allegrezza M
5210	Arborescent matorral with <i>Juniperus</i> spp.	10kmE483N209	Italy	MED	IT9110039, IT9110009, IT9110039	Perrino EV
5330	Thermo-Mediterranean and pre-desert scrub	10kmE445N216	Italy	MED	-	Iamónico D, Senfett M
6110*	Rupicolous calcareous or basophilic grasslands of the <i>Alyso-Sedion albi</i>	10kmE445N220	Italy	MED	-	Angiolini C, de Simone L, Mascia F

Hab ID	Hab name	Cell ID	Country	BR	N2000 Site	Authors
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	10kmE459N207	Italy	MED	-	Fanfarillo E, Fiaschi T, Angiolini C
		10kmE475N204			-	Misano G, Di Pietro R
6510	Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)	10kmE459N207	Italy	MED	-	Fanfarillo E, Fiaschi T, Angiolini C
7210*	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>	10kmE429N187	Italy	MED	-	Rivieccio G, Caria MC, Bagella S
7230	Alkaline fens	10kmE463N214, 10kmE460N213	Italy	ALP MED	IT7110202 IT7110206	Ciaschetti G, Venanzoni R
8130	Western Mediterranean and thermophilous screes	10kmE431N253, 10kmE432N253	Italy	ALP	IT2060005	Patera G
91E0*	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	10kmE488N177	Italy	MED	-	Morabito A, Musarella CM, Spampinato G
9320	<i>Olea</i> and <i>Ceratonia</i> forests	10kmE479N159	Italy	MED	-	Gianguzzi L, Bazan G
9330	<i>Quercus suber</i> forests	10kmE461N167	Italy	MED	-	Gianguzzi L

#102. Annex I Habitat: 1430 Halo-nitrophilous scrubs (*Pegano-Salsoletea*) (Morabito A, Musarella CM, Spampinato G)

EUNIS Classification system: S6625 – Sicilian halo-nitrophilous scrub (EEA 2021).
Biogeographical Region: Mediterranean
National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).
Phytosociological reference: *Atriplici halimi-Artemisietum arborescentis* Biondi 1988 (1–19) *Artemision arborescentis* Géhu et al. 1986, *Salsolo-Peganetalia* Br.-Bl. and O. de Bolòs 1954, *Pegano-Salsoletea* Br.-Bl. and O. de Bolòs 1954 (Biondi and Blasi 2015)
Geographic information: Italy, Calabria, Vibo Valentia, Ricadi, S. Domenica, 33 m a.s.l., Coordinates: 38.665712°N, 15.862635°E (Suppl. material 1: table S1, Rel. 1).
Cells ID in the EEA reference grid: 10kmE483N175 (Suppl. material 2: fig. S1).
Natura 2000 Site Code: SAC IT9340091 “Zona costiera fra Briatico and Nicotera”
Phytosociological table: Suppl. material 1: table S1; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2024).

Notes: This habitat is characterized by nanophanerophyte shrub vegetation and often by succulent halo-nitrophilous chamaephytes, typically found on arid soils, generally salty, in areas with a particularly hot and arid Mediterranean bioclimate of a dry or semi-arid Mediterranean thermal type. This is the first record of 1430 habitat on the Tyrrhenian coast of the Calabria region (Suppl. material 2: fig. S1). Unfortunately, in the Mediterranean region, urbanization and coastalization have had a great impact on this vegetation (Brullo et al. 2013).

#103. Annex I Habitat: 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (Mei G, Stinca A)

EUNIS Classification system: C1 – Surface standing waters (EEA 2019)
Biogeographical Region: Mediterranean
National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).
Phytosociological reference: *Charion vulgaris* (Krause ex Krause and Lang 1977) Krause 1981, *Charetalia hispidae* Sauer ex Krausch 1964, *Charetea fragilis* F.

Fukarek ex Krausch (Biondi and Blasi 2015; Mucina et al. 2016)

Geographic information: Italy, Umbria, Perugia, Pietralunga, Torrente Carpina, 440 m a.s.l., Coordinates: 43.438189°N, 12.410326°E (Suppl. material 1: table S2, Rel. 1); 435 m a.s.l. Coordinates: 43.438109°N, 12.409849°E (Suppl. material 1: table S2, Rel. 2).

Cell ID in the EEA reference grid: 10kmE451N226 (Suppl. material 2: fig. S2)

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S2; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2024).

Notes: The surveys concern the vegetation observed in some water bodies of the Torrente Carpina, characterized by submerged meadows consisting almost exclusively of *Chara vulgaris*, where, however, vascular species of aquatic and river environments and filamentous algae are also present, albeit sporadically. The surveys conducted in the two pools where the vegetation under examination was better represented, outline aspects typical of communities of freshwater bodies of various sizes and depths that can form in peri-fluvial and lacustrine environments with shallow, calcareous waters, from mesotrophic to slightly eutrophic, both permanent and temporary, colonized precisely by species of Charophyceae that give rise to submerged meadows.

#104 Annex I Habitat: 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (Cannucci S, Fiaschi T, Bonari G)

EUNIS Classification system: C1 – Surface standing waters (EEA 2019)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Charion vulgaris* (W. Krause et Lang 1977) W. Krause 1981, *Charetales intermediae* Sauer 1937, *Charetea intermediae* F. Fukarek 1961 (FloraVeg.EU 2024)

Geographic information: Italy, Sardinia, Sud Sardegna, Serrenti, 100 m a.s.l., Coordinates: 39.496716°N, 8.957360°E (Suppl. material 1: table S3, Rel. 1).

Cell ID in the EEA reference grid: 10kmE423N181 (Suppl. material 2: fig. S2)

Natura 2000 Site Code: currently not included in any Natura 2000 site.

Phytosociological table: Suppl. material 1: table S3; nomenclature and taxa delimitation according to Bazzichelli and Abdelahad (2009)

Note: The habitat has been found in a permanent pond where the population of *Chara crassicaulis* occupies the entire water body, from the shallower to the deeper part of the pond.

#105. Annex I Habitat: 3140: Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (Fiaschi T, Fanfarillo E, Angiolini C)

EUNIS Classification system: C1 – Surface standing waters (EEA 2019)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Charetum vulgaris* Corillion 1957, *Charion vulgaris* (Krause ex Krause and Lang 1977) Krause 1981 (Suppl. material 1: table S4, Rels. 1 to 3), *Magno-Charetum hispidae* Corillion 1957, *Charion intermediae* Sauer 1937 (Suppl. material 1: table S4, Rels. 4 to 6), *Charetales hispidae* Sauer ex Krausch 1964, *Charetea intermediae* F. Fukarek 1961 (Biondi and Blasi 2015; Mucina et al. 2016)

Geographic information: Italy, Tuscany, Siena, Castellina in Chianti, 225 m a.s.l., Coordinates: 43.408834°N, 11.219903°E (Suppl. material 1: table S4, Rel. 1); 200 m a.s.l., Coordinates: 43.411386°N, 11.221181°E (Suppl. material 1: table S4, Rel. 2); 233 m a.s.l., Coordinates: 43.402991°N, 11.233139°E (Suppl. material 1: table S4, Rel. 3); Livorno, Piombino, 1 m a.s.l., Coordinates: 42.953814°N, 10.647090°E (Suppl. material 1: table S4, Rel. 4); 3 m a.s.l., Coordinates: 42.954233°N, 10.658377°E (Suppl. material 1: table S4, Rel. 5); 5 m a.s.l., Coordinates: 42.955183°N, 10.657079°E (Suppl. material 1: table S4, Rel. 6)

Cells ID in the EEA reference grid: 10kmE442N225 (Suppl. material 1: table S3, Rel. 1–3), 10kmE437N220 (Suppl. material 1: table S3, Rel. 4–6) (Suppl. material 2: fig. S2).

Natura 2000 Site Code: currently not included in any Natura 2000 site.

Phytosociological table: Suppl. material 1: table S4; vascular *taxa* nomenclature according to Portal to the Flora of Italy (2024); algae nomenclature according to Bazzichelli and Abdelahad (2009).

Notes: This habitat (Suppl. material 2: fig. S3) is represented by algal beds developing in neutral to alkaline freshwaters, either ephemeral (*Charion vulgaris*) or perennial (*Charion intermediae*) (Mucina et al. 2016).

#106. Annex I Habitat: 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (Cannucci S, Mascia F, Angiolini C)

EUNIS Classification system: C1 – Surface standing waters (EEA 2019)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Potamogetonion* Libbert 1931, *Potamogetonetalia* Koch 1926, *Potamogetonetea* Klika in Klika et Novák 1941 (FloraVeg.EU 2024)

Geographic information: Italy, Sardinia, Sud Sardegna, Nurri, 502 m a.s.l., Coordinates: 39.699495°N, 9.221288°E (Suppl. material 1: table S5, Rel. 1); Serramanna, 55 m a.s.l., Coordinates: 39.423460°N, 8.854570°E (Suppl. material 1: table S5, Rel. 2); Villasor, 21 m a.s.l., Coordinates: 39.371320°N, 8.903950°E (Suppl. material 1: table S5, Rel. 3); Oristano, Uras, 30 m a.s.l., Coordinates: 39.719030°N, 8.690880°E (Suppl. material 1: table S5, Rel. 4); Sud Sardegna, Isili, 468 m a.s.l., Coordinates: 39.774150°N, 9.138000°E (Suppl. material 1: table S5, Rel. 5); Portoscuso, loc. Cirfini, 120 m a.s.l., Coordinates: 39.245241°N, 8.397834°E (Suppl. material 1: table S5, Rel. 6); Sanluri, loc. Melas, 137 m a.s.l., Coordinates: 39.581013°N, 8.863990°E (Suppl. material 1: table S5, Rel. 7); Nuoro, Ulassai, 759 m a.s.l., Coordinates: 39.799919°N, 9.455393°E (Suppl. material 1: table S5, Rel. 8); Sassari, Alà dei Sardi, 676 m a.s.l., Coordinates: 40.627238°N, 9.333075°E (Suppl. material 1: table S5, Rel. 9); Cagliari, Capoterra, loc. Tanca di Nissa, 1 m a.s.l., Coordinates: 39.171902°N, 9.011436°E (Suppl. material 1: table S5, Rel. 10)

Cell ID in the EEA reference grid: All the relevés refer to Suppl. material 1: table S5, 10kmE425N184 (Rel. 1), 10kmE422N181 (Rel. 2), 10kmE422N180 (Rel. 3), 10kmE420N184 (Rel. 4), 10kmE424N185 (Rel. 5), 10kmE418N179 (Rel. 6), 10kmE422N183 (Rel. 7), 10kmE427N185 (Rel. 8), 10kmE426N194 (Rel. 9), 10kmE423N178 (Rel. 10) (Suppl. material 2: fig. S4).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S5; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2024).

Note: The habitat has been found in permanent ponds with eutrophic to oligotrophic waters, in natural to semi-natural contexts (e.g. agro-ecosystems, disused quarries), at elevation varying from the sea level to upper 700 m a.s.l. Very widespread in Sardinia, these minor wetlands, even when inserted in a semi-natural territorial matrix, host valuable hydrophytic communities and are of great conservation interest.

#107. Annex I Habitat: 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (Gianguzzi L)

EUNIS Classification system: C1 – Surface standing waters (EEA 2019)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Potamogetonietum perfoliati* Miljan 1933, *Potamogetonion* Libbert 1931, *Potamogeton-*

etalia Koch 1926, *Potamogetonetea* Klika in Klika and V. Novák 1941 (Brullo et al. 1994; Mucina et al. 2016).

Geographic information: Italy, Sicily, Caronia (ME), between Piano Tannu and Piano Perticone, 115 m a.s.l., Coordinates: 38.031348°N, 14.498116°E (Suppl. material 1: table S6, Rel. 1); Coordinates: 38.031293°N, 14.498068°E (Suppl. material 1: table S6, Rel. 2).

Cell ID in the EEA reference grid: 10kmE471N167 (Suppl. material 2: fig. S4).

Natura 2000 Site Code: currently not included in any Natura 2000 Site, located on the outer edge of the SPA ITA030043 “Monti Nebrodi”.

Phytosociological table: Suppl. material 1: table S6; taxonomic nomenclature according to Portal to the Flora of Italy (2024).

Notes: The habitat concerns a small pond located in the coastal belt of the Nebrodi Mountains, at about 115 m a.s.l. (Suppl. material 2: fig. S5). The biotope had already been identified by Brullo et al. (1994), who noted aspects of a swamp community with *Typha dominguensis* (referred to the association *Typhetum dominguensis*) and hygrophilous vegetation with *Potamogeton perfoliatus* (referred to the association *Potamogetonietum perfoliati*). Recent monitoring has confirmed the presence of the habitat, with additional late-spring hygrophytic facies featuring *Potamogeton polygonifolius*. It is situated on the margin of a monophytic community with *Cyperus papyrus* (cl. *Phragmito-Magnocaricetea* Klika in Klika et Novák 1941), among other rare species in Sicily (even if of probable anthropogenic introduction). This further note confirms the phytogeographic interest of the humid environments of Sicily and its various habitats, often found in residual and fragmentary locations, both in the Nebrodi Mts. (De Castro et al. 2008; 2015; Troia et al. 2017), and across other areas of the island (Caldarella et al. 2009, 2013, 2021; Gianguzzi et al. 2013; Gianguzzi and La Mantia 2004, 2008).

#108. Annex I Habitat: 3170*
Mediterranean Temporary Ponds
(Tomaselli V, Tavilla G)

EUNIS Classification system: C3.4 Species-poor beds of low-growing water-fringing or amphibious vegetation (EEA 2019)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: Relevés and tables mentioned in this paragraph refer to Tomaselli et al. (2020): *Coronopo squamati-Damasonietum polyspermi* Tomaselli, Beccarisi, Cambria, Forte, Minissale, Sciandrello, Veronico and Brullo 2022 (table 4, Rels 6–16), *Preslion cervinae* Br.-Bl. ex Moor 1937, *Isoëtetalia* Br.-Bl. 1936, *Isoëto-Nanojuncetea* Br.-Bl. and R. Tx. ex Westhoff, Dijk and Passchier 1946; *Heliotropio supini-Heleochoetum schoenoidis* Rivas

Goday 1955 (table 10, Rels 6–7), *Verbenion supinae* Slavnić 1951, *Nanocyperetalia* Klika 1935, *Isoëto-Nanojuncetea* Br.-Bl. and R. Tx. ex Westhoff, Dijk and Passchier 1946.

Geographic information: Italy, Apulia, Salice Salentino (LE), Iacorizzo, 66 m a.s.l., Coordinates: 40.386944°N, 17.817777°E [table 4 (Rels 6 to 16) in Tomaselli et al. (2020)]; Italy, Apulia, Brindisi, Lo Specchione, 74 m a.s.l., Coordinates: 40.494444°N, 17.884722°E [table 10 (Rels 6 and 7) in Tomaselli et al. (2020)].

Cell ID in the EEA reference grid: 10kmE498N195 [table 4 (Rels 6 to 16) in Tomaselli et al. (2020)], 10kmE499N196 [table 10 (Rels 6 and 7) in Tomaselli et al. (2020)] (Suppl. material 2: fig. S6).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: tables 4 and 10 in Tomaselli et al. (2020); taxonomic nomenclature according to Pignatti (2017–2019).

Notes: Temporary ponds are a type of biologically important habitat that has specialized vegetation dominated mainly by therophytes (Brullo et al. 2022). However, it may also be associated with dwarf geophytes and hemicryptophytes (Brullo et al. 2023). The *Isoëto-Nanojuncetea* class in Apulia was recently studied by Tomaselli et al. (2020). They reported several new associations which were later validated by Tomaselli et al. (2022), in accordance with the 4th edition of the International Code of Phytosociological Nomenclature (Theurillat et al. 2021). These new records are based on the phytosociological research carried out by Tomaselli et al. (2020).

#109. Annex I Habitat: 3170*

Mediterranean Temporary Ponds (Di Pietro R, Minutillo F)

EUNIS Classification system: C3.4 Species-poor beds of low-growing water-fringing or amphibious vegetation (EEA 2019)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Isoetion durieui* Br.-Bl. 1936, *Isoetetalia* Br.-Bl. 1935, *Isoëto-Nanojuncetea* Br.-Bl. and Tx. in Br.-Bl. et al. 1952 (Mucina et al. 2016).

Geographic information: Italy, Lazio, Valle San Vito, Via Limatella, 70 m a.s.l., Coordinates: 41.373151°N, 13.337569°E (Suppl. material 1: table S7, Rel. 1)

Cells ID in the EEA reference grid: 10kmE460N203 (Suppl. material 2: fig. S6)

Natura 2000 Site Code: SAC IT6040006 “Sughereta di San Vito”

Phytosociological table: Suppl. material 1: table S7; taxonomic nomenclature according to Bartolucci et al. (2018) and later updates.

Notes: Temporary ponds habitats are characterized by ephemeral communities normally developed within patches of few square meters size. The new reports here

described regard a SAC of the Lazio administrative region, the “Sughereta di San Vito”, that, in turns, is included in the Ausoni-Lago di Fondi Regional Park. It is a large natural forest area developed on the Terra rossa substrates, which is characterized by the dominance of *Quercus suber* with an understorey mainly composed of *Erica arborea* and *Cistus salvifolius*, together with several other Mediterranean maquis species such as *Pistacia lentiscus*, *Rhamnus alaternus*, *Phillyrea latifolia*, *Myrtus communis*. At present, the *Quercus suber* forest of the San Vito valley is to be considered the largest cork oak wood of the whole Peninsular Italy and it is almost completely assigned to Habitat 9330. However, where the forest canopy is not completely closed, such as where limestone outcrops emerge or along the numerous paths that cross the forest and which were used until a few years ago for the exploitation of cork, communities other than forest ones can be found. In fact, especially within depressed and flat areas subject to temporary flooding during the rainy periods, we found small size patches of meso-hygrophilous mixed therophytic-hemycryptophytic communities characterized by the presence of *Isoetes diuraei* and other species which often characterize temporary ponds such as *Juncus bufonius*, *Serapias lingua*, and *Ranunculus sardous*. These communities are strongly at risk at present. In fact, the colonization of the open areas from the Mediterranean scrub species together with the generalized decrease in rainfalls that have been occurring over the last two decades, are progressively reducing the environments suitable for the development of temporary ponds. Accordingly, these environments to be invaded by perennial grasses and sedges, such in particular *Carex flacca* and *Poa trivialis*, or by other perennial species such as *Oenanthe pimpinelloides*. This new report, together with others published recently (Riveccio et al. 2022), is making the coastal sector of southern Lazio emerge as one of the most prolific for the development of the communities belonging to Habitat 3170 in Italy. To note that no species of the genus *Isoetes* have currently been reported either for the SAC area or for the Ausoni mountains floristic list (see Lucchese and Lattanzi 2000) (Suppl. material 2: fig. S7).

#110. Annex I Habitat: 3240 Alpine rivers and their ligneous vegetation with *Salix eleagnos* (Tesei G, Allegrezza M)

EUNIS Classification system: S911 – Orogeous riverine brush (EAA 2021)

Biogeographical Region: Continental

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: Relevés mentioned in this paragraph refer to table 5 in Allegrezza et al. (2013): *Salicetum apenninae* Pedrotti, Spada and Conti in Pedrotti and Gafta 1996 subass. *eupatorietosum cannabini* Allegrezza et al. ex Allegrezza, Mentoni and Tesei 2013 (Rel. 1), subass. *salicetosum apenninae* Allegrezza et al. ex

Allegrezza, Mentoni and Tesei 2013 (Rels. 2–3), *Salicion apennino-purpureae* Biondi and Allegrezza in Biondi et al. 2014, *Salicetalia purpureae* Moor 1958, *Salicetea purpureae* Moor 1958 (Mucina et al. 2016).

Geographic information: Italy, Marche, Ascoli Piceno, Arquata del Tronto, 1340–1350 m a.s.l., Coordinates: 42.802226°N, 13.277834°E [table 5 in Allegrezza et al. (2013)].

Cells ID in the EEA reference grid: 10kmE458N219 (Suppl. material 2: fig. S8).

Natura 2000 Site Code: SPA IT5330029 “Dalla Gola del Fiastrone al Monte Vettore”, SAC IT5340014 “Monte Vettore e Valle del lago di Pilato”.

Phytosociological table: table 5 in Allegrezza et al. (2013); taxonomic nomenclature according to Conti et al. (2005, 2007).

Notes: The *Salicetum apenninae* plant community refers to *Salix apennina* and *S. purpurea* pioneer willow woods that develop near water sources and within watersheds in mountain and sub-mountain sectors of the Central Apennines. Usually, these communities have a limited extension and a high-shrub growth that rarely exceeds 5 m in height. *Salicetum apenninae* association in the study area is present in the pioneer aspect of this community. Locally, due to the presence of the differential species *Eupatorium cannabinum* and *Campanula trachelium*, the subassociation *eupatorietosum cannabini* appears, indicating conditions of water stagnation and accumulation of organic matter. (Pedrotti et al. 1996; Allegrezza et al. 2010; Allegrezza et al. 2013).

#111. Annex I Habitat: 5210 Arborescent matorral with *Juniperus* spp. (Perrino EV)

EUNIS Classification system: S5131 – Prickly juniper (*Juniperus oxycedrus*) arborescent matorral (EEA 2021)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Oleo sylvestris-Ceratonion siliquae* Br.-Bl. ex Guinochet and Drouineau 1944, *Pistacio lentisci-Rhamnetalia alaterni* Rivas-Martínez 1975, *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine and Nègre 1952 (Mucina et al. 2016)

Geographic information: Italy, Apulia, Foggia, Mattinata, Coppa Acchiatora, 464 m a.s.l., Coordinates: 41.758487°N, 16.112101°E (Suppl. material 1: table S8, Rel. 1); Italy, Foggia, Mattinata, Valle dei Carri, 379 m a.s.l., Coordinates: 41.765712°N, 16.119079°E (Suppl. material 1: table S8, Rel. 2).

Cells ID in the EEA reference grid: 10kmE483N209 (Suppl. material 2: fig. S9)

Natura 2000 Site Code: SPA IT9110039 “Promontorio del Gargano” and SAC IT9110009 “Valloni di Mattinata-Monte Sacro” (Suppl. material 1: table S8, Rels. 1 and 2), SPA IT9110039 “Promontorio del Gargano” (Suppl. material 1: table S8, Rel. 2)

Phytosociological table: Suppl. material 1: table S8; taxonomic nomenclature according to Bartolucci et al. (2018).

Notes: In the study area, along the gravel internal road, which connects the SS89 (internal road) with the SP53 (coastal road), it is possible to observe a high extension of *Juniperus oxycedrus* shrub vegetation, already reported for Gargano (Perrino et al. 2013), with different geographical orientation. In two of these places, in the Acchiatora and Valle dei Carri localities, phytosociological surveys were carried out (Suppl. material 2: fig. S10).

#112. Annex I Habitat: 5330 Thermo-Mediterranean and pre-desert scrub (Iamónico D, Senfett M)

EUNIS Classification system: S51L – *Ampelodesmos mauritanica* – dominated garrigues (EEA 2021)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Hyparrhenion hirtae* Br.-Bl. et al. 1956, (syn. *Avenulo cincinnatae-Ampelodesmion mauritanici* Minissale 1995), *Cymbopogono-Brachypodietalia ramosi* Horvatić

1963, *Lygeo sparti-Stipetea tenacissimae* Rivas-Mart. 1978 (Minissale 1995; Di Pietro et al. 2016; Mucina et al. 2016).

Geographic information: Italy, Tuscany, Grosseto, Manciano, 254 m a.s.l., Coordinates: 42.547222°N, 11.568889°E (Suppl. material 1: table S9, Rel. 1).

Cell ID in the EEA reference grid: 10kmE445N216 (Suppl. material 2: fig. S11).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S9; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2024).

Notes: The *Ampelodesmos mauritanicus* community occurring in the found site is overlapped with the priority habitat 6110* (Rupicolous calcareous or basophilic grasslands of the *Alyso-Sedion albi*). An ongoing colonization of the species of the habitat 5330 is clearly happening and the habitat 6110* is endangered. To note, moreover, that the typical habitat 6110* is adjacent to the 5330 and scattered individuals of *A. mauritanicus* (Poir.) T.Durnand & Schinz and *Cistus salviifolius* L. already occur there (Suppl. material 2: fig. S12).

#113. Annex I Habitat: 6110* Rupicolous calcareous or basophilic grasslands of the *Alyso-Sedion albi* (Angiolini C, de Simone L, Mascia F).

EUNIS Classification system: R13 Cryptogam- and annual-dominated vegetation on calcareous and ultramafic rock outcrops (formerly E1.1 – Inland sand and rock with open vegetation) (EEA 2021)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Alysso alyssoidis-Sedion* Oberd. and T. Müller in T. Müller 1961, *Alysso-Sedetalia* Moravec 1967, *Sedo-Scleranthetea* Br.-Bl. 1955 (Mucina et al. 2016).

Geographic information: Italy, Tuscany, Siena, Campiglia d'Orcia, Rocca di Campiglia, on the trail to climb the massive calcarenitic rock formation at the top of the town.

775 m a.s.l., Coordinates: 42.9457697°N, 11.6689412°E (Suppl. material 1: table S10, Rels. 1–3).

Cells ID in the EEA reference grid: 10kmE445N220 (Suppl. material 2: fig. S13).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S10; taxonomic nomenclature according to Portal to the Flora of Italy (2024).

Notes: The relevés have been carried out in the calcareous outcrops of the area, characterised by open xerothermophile pioneer communities. Interestingly, the sampling area is formed by a locally rare grey calcarenitic outcrop. The surrounding areas of the cell are characterised by other types of geological outcrops, i.e. scaglia, jasper, shales, volcanic sediments and pliocenic clays. All investigated relevés are similar in geomorphological features, being on grey calcarenitic limestone type with elevated slopes and scarce soil. The reported presence of EU Habitat 6110* is to be considered extremely localised for this investigated area within the cell 10kmE445N220.

#114. Annex I Habitat: 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (Fanfarillo E, Fiaschi T, Angiolini C).

EUNIS Classification system: R55 – Lowland moist or wet tall-herb and fern fringe (EEA 2021)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Geo urbani-Alliarion officinalis* Lohmeyer et Oberd. in Gors and T. Müller 1969, *Galio-Alliarietalia* Oberd. in Gors and T. Müller 1969, *Epilobietea angustifolii* Tx. and Preising ex von Rochow 1951 (Mucina et al. 2016).

Geographic information: Italy, Latium, Frosinone, Alatri, 441 m a.s.l., Coordinates: 41.7354907°N, 13.3024914°E (Suppl. material 1: table S11, Rel. 1).

Cells ID in the EEA reference grid: 10kmE459N207 (Suppl. material 2: fig. S14).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S11; taxonomic nomenclature according to Portal to the Flora of Italy (2024).

Notes: This habitat is found on the edge of mesic woods (*Carpino betuli-Coryletum avellanae* Ballelli, Biondi and Pedrotti 1980 ex Venanzoni 1989 – Suppl. material 2: fig. S15) developing along very small waterbodies, pertaining to the habitat 91L0 – Illyrian oak-hornbeam forests (*Erythronio-Carpinion betuli*) (Tavilla et al. 2022).

#115. Annex I Habitat: 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (Misano G, Di Pietro R)

EUNIS Classification system: R55 – Lowland moist or wet tall-herb and fern fringe (EEA 2021)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Senecionion fluviatilis* Tx. ex Moor 1958, *Convolvuletalia sepium* Tx. ex Moor 1958; *Epilobietea angustifolii* Tx. et Preising ex von Rochow 1951 (Mucina et al. 2016).

Geographic information: Apulia, Celle di San Vito, Valle del Celone, 595 m a.s.l., Coordinates: 41.331856°N, 15.177899°E (Suppl. material 1: table S12, Rel. 1).

Cells ID in the EEA reference grid: 10kmE475N204 (Suppl. material 2: fig. S14).

Natura 2000 Site Code: currently not included in any Natura 2000 Site

Phytosociological table: Suppl. material 1: table S12; taxonomic nomenclature according to Bartolucci et al. (2018) and later updates.

Notes: Perennial hygrophilous and nitrophilous vegetation with megaforbs that can be included in habitat 6430 (new habitat for the Puglia Region). In particular, the communities investigated belong to the subtype: 37.7 – Wet and nitrophilous tall herb edge communities, along water courses and woodland borders. This vegetation types are found in areas where the stream current loses its speed leading to the deposit of a large part of the biomass transported. These environmental conditions favor the entrance in the community of slightly nitrophilous species. The syntaxonomic reference at the rank of association could be the *Phalarido-Petasitetum hybridi* due to the clear dominance of *Petasites hybridus* (Suppl. material 2: fig. S16), although this reference is to be considered absolutely preliminary. Also, at the ranks of alliance and order the possible reference is not univocal. The *Phalarido-Petasitetum hybridi* shows similarities for both the *Convolvuletalia sepium* Tx. ex Moor 1958 and the *Galio-Alliarietalia* Oberd. in Gors and T. Müller 1969. On the basis of Mucina et al. (2016) the reference class should be *Epilobietea angustifoliae* whereas, according to Biondi et al. (2009), it should be more properly assigned to the *Filipendulo ulmariae-Convolvuletea sepium* Géhu and Géhu-Franck 1987 or to the *Galio aparines-Urticetea dioicae* Passarge ex Kopecký 1969.

#116. Annex I Habitat: 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) (Fanfarillo E, Fiaschi T, Angiolini C).

EUNIS Classification system: R22 – Low and medium altitude hay meadows (EEA 2021)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Salvio pratensis-Dactylidion glomeratae* Ubaldi et al. in Ubaldi 2003, *Arrhenatheretalia elatioris* Tx. 1931, *Molinio-Arrhenatheretea* Tx. 1937 (Mucina et al. 2016).

Geographic information: Italy, Latium, Frosinone, Alatri, 451 m a.s.l., Coordinates: 41.741307°N, 13.319902°E (Suppl. material 1: table S13, Rel. 1); 457 m a.s.l., Coordinates: 41.733282°N, 13.301203°E (Suppl. material 1: table S13, Rel. 2); Coordinates: 41.734962°N, 13.299564°E (Suppl. material 1: table S13, Rel. 3); 449 m a.s.l., Coordinates: 41.735865°N, 13.302124°E (Suppl. material 1: table S13, Rel. 4); 492 m a.s.l., Coordinates: 41.738524°N, 13.300576°E (Suppl. material 1: table S13, Rel. 5); 503 m a.s.l., Coordinates: 41.733002°N, 13.288722°E (Suppl. material 1: table S13, Rel. 6); 449 m a.s.l., Coordinates: 41.7358267°N, 13.3020870°E (Suppl. material 1: table S13, Rel. 7).

Cells ID in the EEA reference grid: 10kmE459N207 (Suppl. material 2: fig. S17).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S13; taxonomic nomenclature according to Portal to the Flora of Italy (2024).

Notes: These species-rich, mesic semi-natural grasslands (Suppl. material 2: fig. S18) are managed as both pastures and hay meadows, which is a traditional management strategy of central Apennines. Extensive sheep grazing is present from late summer to early spring. Grazing is then stopped by the end of March to let the plants grow, and hay harvesting is carried out usually by the end of June. Despite not being the most typical aspect of habitat 6510 (*Arrhenatherion elatioris*), such pastures-meadows are still considered examples of such habitat. In fact, they represent the typical lowland hay meadows occurring in the biogeographic context of the Italian Peninsula, where the *Arrhenatherion elatioris* vegetation is missing and other alliances, such as *Salvio-Dactylidion* and *Ranunculion velutini*, are considered appropriate syntaxonomic references for habitat 6510 (Biondi et al. 2009). Consistently, habitat 6510 is very rich in species and complex, so that target species for monitoring purposes should be identified regionally (Angelini et al. 2016). In the discovery area, such grasslands are still very common and inserted into a type 2 High Nature Value agricultural landscape, i.e., farmland dominated by low intensity agriculture or a mosaic of semi-natural and cultivated land

and small scale features (Fanfarillo et al. 2017a,b). Nearby, some aspects of the habitat 6510 were also recorded in traditionally managed olive groves (Fanfarillo et al. 2019).

#117. Annex I Habitat: 7210* Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (Rivieccio G, Caria MC, Bagella S)

EUNIS Classification system: Q534 – Fen *Cladium mariscus* beds (EEA 2021)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Magnocaricion elatae* Koch 1926, *Magnocaricetalia elatae* Pignatti 1953, *Phragmito australis-Magnocaricetea elatae* Klika in Klika and Novák 1941 (Biondi and Blasi 2015; Venanzoni et al. 2018).

Geographic information: Italy, Sardinia, Nuoro, Lotzorai, 1 m a.s.l., Coordinates: 39.977407°N, 9.685115°E (Suppl. material 1: table S14, Rel. 1); Coordinates: 39.977203°N, 9.685306°E (Suppl. material 1: table S14, Rel. 2); 2 m a.s.l., Coordinates: 39.975602°N, 9.686469°E (Suppl. material 1: table S14, Rel. 3); 1 m a.s.l., Coordinates: 39.975579°N, 9.686204°E (Suppl. material 1: table S14, Rel. 4);

Cell ID in the EEA reference grid: 10kmE429N187 (Suppl. material 2: fig. S19)

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S14; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2024).

Notes: This is the fourth contribution regarding habitat 7210* in the Sardinia region, with the first records reported at Platamona, Li Cossi, and Sant’Imbenia coastal areas (Gigante et al. 2019b; Gianguzzi et al. 2020; Morabito et al. 2023). The reported presence of *Cladium mariscus* in the Nuoro province is credited to Desfayes (2008), to whom we are grateful for providing precise coordinates. The habitat here appears highly fragmented and impacted by extensive coastal usage. Small and large nuclei of *C. mariscus* dominant, with Desfayes (2008) suggesting a large one with an extension of around 500 m², are spaced perpendicular all along the Lido, indicating a historically larger distribution. The presence of invasive alien species, areas being used as landfills, and a noticeable progressive phenomenon of burial, also attributed to the litter of pine and eucalyptus planted nearby, highlight the strong human impact on these valuable plant communities.

#118. Annex I Habitat: 7230 Alkaline fens (Ciaschetti G, Venanzoni R)

EUNIS Classification system: Q41 – Alkaline, calcareous, carbonate-rich small-sedge spring fen (EEA 2021)

Biogeographical Region: Alpine (Suppl. material 1: table S15, Rel. 1); Mediterranean (Suppl. material 1: table S15, Rel. 2).

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Eleocharitetum quinqueflorae* Lüdi1921 (table 1, Rel. 9 in Ciaschetti et al. 2024) and *Blysmus compressus* community (table 5, Rel. 1 in Ciaschetti et al. 2024), *Caricion davallianae* Klika 1934, *Caricetalia davallianae* Br.-Bl. 1949, *Scheuchzeria palustris-Charicetea fuscae* Tx. 1937 (Biondi and Blasi 2015)

Geographic information: Italy, Abruzzo, Pescara, Carpineto della Nora, Voltigno Valley, 1367 m a.s.l., Coordinates: 42.362506°N, 13.793327°E (table 5, Rel. 1 in Ciaschetti et al. 2024); Italy, Abruzzo, L'Aquila, Lucoli, Campo Felice, 1530 m a.s.l., Coordinates: 42.219103°N, 13.449551°E (table 1, Rel. 9 in Ciaschetti et al. 2024).

Cell ID in the EEA reference grid: 10kmE463N214 (table 5, Rel. 1 in Ciaschetti et al. 2024); 10kmE460N213 (table 1, Rel. 9 in Ciaschetti et al. 2024) (Suppl. material 2: fig. S13).

Natura 2000 Site Code: ZSC IT7110202 “Gran Sasso” (Suppl. material 1: table S15, Rel. 1); ZSC IT7110206 “Monte Sirente e Monte Velino” (Suppl. material 1: table S15, Rel. 2).

Phytosociological table: table 1, Rel. 9 and table 5, Rel. 1 in Ciaschetti et al. 2024; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2024).

Notes: The habitat is already reported for the two Natura 2000 sites, even if in other localities out from the above-mentioned cells of the EEA reference grid.

#119. Annex I Habitat: 8130 Western Mediterranean and thermophilous scree (Patera G)

EUNIS Classification system: U28 – Western Mediterranean base-rich scree (EEA 2021)

Biogeographical Region: Alpine

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Festucetum spectabilis* Pedrotti 1970, *Stipion calamagrostis* Jenny-Lips ex Quantin 1932, *Stipetalia calamagrostis* Oberdorfer and Seibert in Oberdorfer 1977, *Thlaspietea rotundifolii* Br.-Bl. 1948 (Biondi and Blasi 2015).

Geographic information: Italy, Lombardy, Bergamo, Oltressenda Alta, 992 m a.s.l., Coordinates: 45.923123°N, 9.945920°E (Suppl. material 1: table S15, Rel. 1); Colere, 996 m a.s.l., Coordinates: 45.9463918°N, 10.096658°E (Suppl. material 1: table S15, Rel. 2).

Cell ID in the EEA reference grid: 10kmE431N253, 10kmE432N253 (Suppl. material 2: fig. S21)

Natura 2000 Site Code: SAC IT2060005 “Val Sedornia – Val Zurio – Pizzo della Presolana”

Phytosociological table: Suppl. material 1: table S15; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2024).

Notes: The pioneer tufted grasslands of carbonate debris are referred to the association *Festucetum spectabilis*. These communities, developed on the more stabilized margins of the scree, are also characterized both by the presence of species from the xerophilous mountain pastures of the *Festuco-Brometea*, and from the alpine grasslands of the *Seslerietalia caeruleae* (Suppl. material 2: fig. S22). These are the first reported sites of occurrence of this habitat for the Orobie Bergamasche Regional Park.

#120. Annex I Habitat: 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) (Morabito A, Musarella CM, Spampinato G)

EUNIS Classification system: T14B13 (formerly, G1.1313) – Western Mediterranean alder and ash-alder galleries (EEA 2021)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009)

Phytosociological reference: *Ligustro vulgaris-Alnion glutinosae* Poldini, Sburlino and Venanzoni 2015 in Biondi et al. 2015, *Populetales albae* Br.-Bl. ex Tchou 1948, *Salici purpureae-Populetea nigrae* (Rivas-Mart. and Cantó ex Rivas-Mart. et al. 1991) Rivas-Mart. and Cantó 2002 (Biondi and Blasi 2015).

Geographic information: Italy, Calabria, Catanzaro, Giritale, C. Pellegrini, 358 m a.s.l., Coordinates: 38.829096°N, 16.405749°E (Suppl. material 1: table S16, Rel. 1)

Cells ID in the EEA reference grid: 10kmE488N177 (Suppl. material 2: fig. S23)

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S16; nomenclature and taxa delimitation according to Portal to the Flora of Italy (2024).

Notes: In Calabria, this habitat refers to *Ligustro vulgaris-Alnion glutinosae* Poldini, Sburlino and Venanzoni in Biondi et al. 2015, in accordance with Biondi et al. (2015) and Sciandrello et al. (2023).

#121. Annex I Habitat: 9320 *Olea* and *Ceratonia* forests (Gianguzzi L, Bazan G)

EUNIS Classification system: T241 (formerly G2.41) – Wild *Olea europaea* forest (EEA 2021).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Ruto chalepensis-Oleetum sylvestris oleetosum sylvestris* Gianguzzi and Bazan 2019, *Oleo sylvestris-Ceratonion siliquae* Br.-Bl. ex Guinochet and Drouineau 1944, *Pistacio lentisci-Rhamnetalia alaterni* Rivas-Martínez 1975, *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine and Nègre 1952 (Biondi and Blasi 2015).

Geographic information: Italy, Sicily, Contrada San Crispino, Cammarata, 460 m a.s.l., Coordinates: 37.637696°N, 13.679069°E (Suppl. material 1: table S17, Rel. 1); Italy, Sicily, Contrada San Crispino, Cammarata, 467 m a.s.l., Coordinates: 37.637754°N, 13.678886°E (Suppl. material 1: table S17, Rel. 2).

Cell ID in the EEA reference grid: 10kmE462N162 (Suppl. material 2: fig. S24).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S17; taxonomic nomenclature according to Portal to the Flora of Italy (2024).

Notes: Recent studies in phytosociology have focused on the oleaster vegetation of Sicily, accompanied by distributional analyses that have updated information on habitat 9320 (Bazan et al. 2021; Riviuccio et al. 2023). Additional research in geobotany that examines both the flora and plant communities in central Sicily (Gianguzzi et al. 2014a, 2014b, 2016) has uncovered an additional notable instance of this habitat in Agrigento province. This formation has been phytosociologically referred to the association *Ruto chalepensis-Oleetum sylvestris* subass. *oleetosum sylvestris* (Suppl. material 2: fig. S25). Historically, oleasters were commonly utilized as rootstocks for olive trees in agricultural settings. Changes in agricultural practices (Bazan et al. 2020) and the neglect of ancient olive orchards, some of which are several hundred years old (Schicchi et al. 2021), have facilitated the resurgence of oleaster populations.

#122. Annex I Habitat: 9330 *Quercus suber* forests (Gianguzzi L)

EUNIS Classification system: T21 (formerly: G2.1) – Mediterranean evergreen *Quercus* forest (EEA 2021).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Genisto aristatae-Quercetum suberis* Brullo 1984 *pistacietosum lentisci* Brullo, Gianguzzi, La Mantia et Siracusa 2008; *Erico arboreae-Quercion ilicis* Brullo, Di Martino et Marcenò 1977; *Quercetalia ilicis* Br.-Bl. ex Molinier 1934; *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine et Nègre 1952 (Biondi and Blasi 2015).

Geographic information: Italy, Sicily, Altofonte, near Cozzo Maglio, 250 m a.s.l., Coordinates: 38.054277°N, 13.297671°E (Suppl. material 1: table S18, Rel. 1); Italy, Sicilia, Altofonte, near Cozzo Maglio, 280 m a.s.l.,

Coordinates: 38.054458°N, 13.298639°E (Suppl. material 1: table S18, Rel. 2).

Cell ID in the EEA reference grid: 10kmE461N167 (Suppl. material 2: fig. S26).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. material 1: table S18; taxonomic nomenclature according to Portal to the Flora of Italy (2024).

Notes: The habitat consists of small forest clusters of *Quercus suber*, located on isolated quartzarenitic outcrops in the Palermo Mts., in areas largely dominated by carbonate substrates (limestone, dolomite, etc.). From a syntaxonomic perspective, they are referred to the association *Genisto aristatae-Quercetum suberis* subass. *pistacietosum lentisci* (Brullo et al. 2008; Suppl. material 2: fig. S27), widespread in the northern sector of Sicily on loosely coherent siliceous substrates (quartzarenites, as well as sands, flysch, etc.), in markedly xeric conditions. It is reported for the elevations of the Trapanese [Zingaro Nature Reserve, Bosco Scorace, Mt. Inici, Bosco Calatafimi (Bazan et al. 2021; Riviuccio et al. 2022)], Palermo area [Misilmeri, Mt. Cani (Caldarella et al. 2009), Bosco Ficuzza, Bosco Granza], Madonie Mts. Nebrodi Mts., and Peloritani Mts. (Gianguzzi et al. 2016). These clusters are particularly threatened, due to their rarity in the territory but also because of frequent fires affecting the area (Capotorti et al. 2020).

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Supplementary material 1

Phytosociological tables

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Supplementary material 2

Maps and photos

Authors: Giovanni Riveccio, Marina Allegrezza, Claudia Angiolini, Simonetta Bagella, Gianmaria Bonari, Silvia Cannucci, Maria Carmela Caria, Giampiero Ciaschetti, Leopoldo de Simone, Romeo Di Pietro, Emanuele Fanfarillo, Tiberio Fiaschi, Lorenzo Gianguzzi, Francesco Mascia, Duilio Iamónico, Giacomo Mei, Francesco Minutillo, Giuseppe Misano, Antonio Morabito, Carmelo Maria Musarella, Glauco Patera, Enrico Vito Perrino, Marco Senfett, Giovanni Spampinato, Adriano Stinca, Gianmarco Tavilla, Giulio Tesei, Valeria Tomaselli, Roberto Venanzoni, Giuseppe Bazan

Data type: pdf

Explanation note: figures with the new cells distribution in Italy and with closeup pictures of vegetation types.

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